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ORIGINAL ARTICLES.

RECENT OBSERVATIONS CONCERNING GLAUCOMA.*

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The subject of glaucoma is of perennial interest. Its gravity, the certainty of resulting blindness, if the process be unchecked, the terrible suffering it may cause, profoundly depressing all the functions of organic life, the brilliant results attained by treatment in some cases, but the uncertainty as to the outcome that must be faced in undertaking its treatment, the obscurity that still prevails with regard to many points in its pathology, the multiplicity of measures proposed and still resorted to for its relief, the frequent failure to recognize it on the part of members of the general medical profession and the laity, all combine to give it an interest for the ophthalmologist, and to cause it to occupy a share of his attention out of proportion to the number of cases encountered.

Within the last few years there has been great activity in this department of ophthalmology. Much has been added to the literature in the way of clinical observations and laboratory studies. A whole series of new operations have been proposed for the relief of glaucoma; and although much has been written about them, their general value and special applicability to par-

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ticular cases are still not well determined. Two strongly contrasted cases, that I now have under observation, will serve to bring before us some important points with regard to the pathology of glaucoma.

Case I.—Mrs. D., aged 63, consulted me first September 26th, 1905. She is a rather large, stout woman, of good muscular development, who has raised a large family of children. She began wearing glasses when 37 years of age; had used them for near work only, for the last ten years, using R. and L.+4.50 Sph. She complains of difficulty with near work; and periods of blurring of sight, and discomfort about the eyes. Vision, R. 4/22 partly; L. 4/12 partly. She has accommodation of 1 D. in each eye. With the ophthalmoscope the media are clear, the general choroid rather thin, with decided thinning to the temporal side of each disk. The optic disks are red and slightly hazy; the right presenting a broad shallow physiological excavation, the left a cup extending almost to the disk margin, 2.5 D. less hyperopic than the surrounding fundus, and having an overhanging edge above, but not at its lower margin. There was no pulsation of the retinal vessels.

At this visit and at two others within a week, the intraocular tension was normal in both eyes. The field of vision for the left eye was contracted, chiefly above and to the nasal side. The field of the right eye was normal. Her pupils were equal with good reactions, 4 mm. in diameter with moderate light. Her correction and corrected vision were:

R.+3.50 S.=4/4+

L.+3.50 S.=4/4

The above lenses were prescribed for distance, and +2 D. Sph. added for near. She was warned as to glaucoma, its danger, and the need for prompt action in case it developed. But with the glasses her eyes became entirely comfortable, the attacks of blurring and discomfort ceased, and I did not see her for nearly three years.

1908/9/2. She came with the statement that a week ago she found the sight in the left eye was very bad, there had been some pain after use of the eyes. There was no inflammation. The pupils were equal, 4 mm. in diameter in moderate light, and normal in reaction. The left eye felt "full" and "big" in the morning, and she could not see on rising. Corrected vision: R. 4/4 partly, L. 4/45 eccentric. Eye free from hyperemia. With the ophthalmoscope the glaucoma cup was characteristic; and small hæmorrhages were numerous throughout the retina.

Tension about normal. She was placed on the local use of pilocarpin.

9/14. She complained of neuralgic pain about the left eye +T. 1, pupil slightly dilated. Eserin sulphate 1 per cent. was instilled. Two days later she became very tired, and the following night the eye was congested and very painful. Eserin sulphate ¼ of 1 per cent. every 4 hours kept the pupil moderately contracted and relieved the pain.

9/20. The tension had risen to +3. The eye was hyperemic. Eserin had no effect upon the pupil. Posterior sclerotomy was done 8 mm. back from the limbus on the temporal side of the eyeball. There was free escape of the fluid from the vitreous, with some blood. Immediately after the operation the anterior chamber was two-thirds filled with blood, probably from rupture of a vessel of the iris, when the tension of the eyeball was diminished.

9/21. The eye quite free from pain, but +T. 1 with a clot in the anterior chamber.

9/29. There has been return of pain, the anterior chamber is one-half full of blood. The pupil is 5 mm. in diameter in spite of eserin used every two hours. +T. 2 slightly lowered by massage of the eyeball, with marked bulging at the site of the sclerotomy.

10/7. The condition is much the same. The swelling at the point of the scleral incision is 5 mm. in diameter, and 4 mm. high. +T. 2. Eye uncomfortable nearly all the time.

10/9. Under ether, with the head high, I did iridectomy upward, making a large conjunctival flap. There was free conjunctival hæmorrhage. The iris was very rotten. But reintroduction of the forceps, on either side, secured the removal of a large portion, which was dragged away from its ciliary attachment. A thread of iris was, intentionally, left incarcerated in each angle of the scleral wound. There was no excessive hæmorrhage from the iris. Next day the eye was quite comfortable most of the time, the anterior chamber half full of blood. Bulging of the sclerotomy scar had diminished.

10/16. Blood clot 2 mm. broad at bottom of anterior chamber. —T. 1. Little bulging in either scar. Anterior chamber shallow. Eye less hyperemic. Free from pain.

10/23. Eye comfortable. Tension —T. 1. Scars flat. Anterior chamber a little deeper. Blood entirely gone from it, doubtful reflex from the fundus. The eye retains light perception, all the vision it has had since the first acute attack.

1909/10/29. Eye quiet, —T. 1. No sign of glaucoma in the other eye.

Case II.—October 29, 1904, Prof. H., aged 78, came for a change of glasses. There was faint nuclear haze in each lens. The disks were dragged to the temporal side and slightly downward, with crescents of choroidal atrophy one-fifth as wide as the disks. No pulsation of the retinal vessels. Doubtful appearance of a glaucoma cup in the right eye. Fields of vision normal. Acuteness of vision:

R. 4/22 with +0.25 sph⌒+1.50 cy. axis 10°=4/15

L —0.50 sph⌒+2. cy. axis 170°=4/5 partly.

March 19, 1907. When I next examined his eyes I found corrected vision reduced to R. 4/45, L. 4/8 mostly. The disks were pale. The right cupped almost to the extent of the disk, with abrupt edges, 1.5 D. in depth. L. doubtful cupping. The scleras were rather firm and at this time tension was recorded as +T. I have never since felt sure that the tension was above normal. The pupils were circular, equal, and with fair reaction to light. He was placed on the local use of pilocarpin, two grains to the fluid ounce.

8/14. The condition was practically the same. The fields were R. much contracted, L. normal.

1908/9/11. Corrected vision R. 1/40, L. 4/12. The pilocarpin was increased to 1 grain to the fluid drachm, used four times daily. This would contract the pupils to 1.5 mm. He was also put upon the use of strychnia, 1/32 of a grain three times a day.

1909/4/12. Corrected vision R. 1/40, L. 4/9 mostly. Fields remained practically the same as when previously taken. The left normal.

These cases are of interest because the conditions present are known for years before a diagnosis could be made—even of simple glaucoma. With regard to the second case: in spite of the cupping of the optic disk, the impaired vision including great contraction of the field, and the apparent arrest of the process by a miotic, it is still doubtful if a diagnosis of glaucoma is absolutely justified. In the first case the symptoms including attacks of blurred vision were entirely relieved for the time by correction of the ametropia, with proper addition of lenses for presbyopia. When the patient returned three years later there still was no increase of tension although central vision had been lost, and the retina was studded with hæmorrhages. In the second case, since the patient returned with symptoms that justi-

fied treatment for glaucoma, the process has been held in check by the use of pilocarpin, which still produces a good contraction of the pupil; and it would seem that this control of the intraocular tension might be maintained throughout life. It is most strikingly shown in the preservation of the visual field, in spite of cupping and pallor of the disk.

These two cases belong to radically different forms of glaucoma. The first represents the type of acute hæmorrhagic glaucoma with marked increase in tension. The second is one of those rare cases of which it is difficult to decide whether they should be classed with simple glaucoma or primary atrophy of the optic nerve.

Probably the best brief definition of glaucoma that we have to-day is that of Priestley Smith:[1] "An excess of pressure within the eye, plus the causes and consequences of that excess." Yet, as Smith points out, some cases of undoubted glaucoma go on for years with the intraocular tension much of the time not in excess of the normal. If the optic nerve changes in glaucoma arise from the excess of pressure it is by loss of balance between the intraocular pressure and the nutritive resistance of the nerve. We can conceive that a similar loss of balance, leading to very similar results, might be produced by decrease of the nutritive resistance, with normal intraocular pressure, as well as by increase of pressure overcoming normal nutritive resistance. Cases of this sort may be regarded as glaucoma, in which the increase of pressure is not absolute, but merely relative, brought about by impaired nutrition; and still it would be proper to regard the excavation of the nerve head as due to a pressure atrophy.

INCREASED BLOOD PRESSURE AND GLAUCOMA.

Here we come upon a subject of the greatest interest. The relation of blood pressure to the nutrition of the eye; and to normal intraocular pressure and glaucoma. The range of intraocular pressure is absolutely limited by that of the blood pressure. Under no circumstances can the pressure within the eyeball rise above the pressure in the arteries, or fall below the pressure in the veins. Thomson Henderson[2] believes that we may go farther than this; and, as Leonard Hill has demonstrated that the intracranial pressure is equal to the capillary venous pressure and varies greatly with it, so under physiological conditions "the intraocular pressure equals that in the venous sinus of Schlemm's canal." The tendency of thrombosis of the central retinal vein

to lead to glaucoma has been generally recognized, and is especially emphasized in the recent papers of Harms, Coats, and Verhoeff. Thrombosis must raise the blood pressure to a maximum in the veins affected, and it probably increases to a notable extent blood pressure in other veins and in the capillaries of the part.

Of the variations in capillary and venous pressure our knowledge is yet less definite and less exact; but of the changes in the arterial blood pressure we are rapidly accumulating an immense amount of definite and highly important information. Now in these two cases above reported the arterial pressure differed most widely. In Case I it was 165 to 175 mm. of mercury. In Case II it was 110 to 115 mm. of mercury. The physical factors that determine arterial pressure are heart action and peripheral resistance, and it is scarcely conceivable that peripheral resistance should be greatly increased without alteration of capillary pressure and alteration of the processes of nutrition. Along with heightened arterial pressure there is doubtless a certain re-adaptation of capillary pressure and nutritive process, so that the net results are an approximation to the physiologic balance. With arterial pressure markedly diminished must go changes in capillary circulation and nutrition in an opposite direction, to preserve an approach to the same physiologic balance.

It seems rational to associate the differences between these two forms of glaucoma with this radical difference in the arterial pressure. For the farther study of this connection, as well as for other important reasons I heartily endorse the statement of Dunn:[3] "No case of essential glaucoma, acute or chronic, can to-day be considered as fully examined until the patient's pulse tension has been measured by the sphygmomanometer, and the information thus obtained has been given due consideration."

Dunn says that since his attention has been directed to it in every case of essential glaucoma, except those occurring in early youth, he has found the pulse tension above normal, and in the severer cases very much above normal; and that in proportion as the pulse tension is raised the prognosis, both as to the probable course of the disease and as to surgical interference, is bad. He also thinks that where glaucoma is not developed the danger of provoking an attack by use of a mydriatic is greater with increased arterial pressure.

Frenkel,[4] among 15 cases of glaucoma found that in 14 the arterial blood pressure was increased, 140 to 210 mm., at least a

portion of the time. In one of them the diminution of the blood pressure from 190—200 to 175—180, was accompanied by diminution of the intraocular tension from +T. 3 to +T. 1. In a case of hæmorrhagic glaucoma, myocarditis and arteriosclerosis it fluctuated between 95 and 160 mm.

Now that we have begun to study systematically the arterial pressure, its consideration in connection with glaucoma offers several suggestions. Evidently the extremely high intraocular tension noted in some cases, 150 mm. or more of mercury, could only occur in patients suffering from high arterial tension. Yet high arterial tension alone does not cause glaucoma. Of the few patients I have seen whose blood pressure ran above 250 mm. none suffered from glaucoma. Frenkel noted with renal retinitis higher blood pressure than in any of his glaucoma cases. An interesting possibility is the connection of high blood pressure with malignant glaucoma, or with very acute outbreaks; or, indeed, with the glaucomatous attack or exacerbation in general. The glaucomatous outbreak following conditions likely to cause temporary increase of blood pressure is illustrated in the following cases.

Case III.—Mrs. A., aged 35, for years had noticed rings of color around the light, at rare times when she was much excited. When first seen she suffered from blurring of vision, great limitation of the field in the left eye, with deep glaucoma cup, halo atrophy, veins almost collapsed on the disk, arterial pulse and noticeable increase of tension at times. While she was under observation every attack followed some special occasion for excitement.

Case IV.—Mrs. C., aged 56, experienced her first acute attack of glaucoma after standing several hours by the death bed of her husband. She suffered from cold, the wind blowing on the right side of her face, and that night had the first terrible pain in her right eye and head. Vision, when I saw her, was reduced to moving objects in the temporal portion of the field. Tension +T. 2. She declined operation and was kept comfortable most of the time by eserin. A year later the right eye still pained occasionally when she caught cold, and the left continued normal.

Case V.—Mrs. H., aged 68, with a moderate acute glaucoma +T. 2, was under temporary stress and excitement, bringing a daughter ill with tuberculosis to Denver. Her arterial pressure was 175 mm.

We can see that an eye, in which the outflow of fluid is barely sufficient to keep the tension from going above normal, will be almost certain to suffer a glaucomatous attack if increased blood pressure arises causing increased transudation of intraocular fluid.

Case I. seems at least to suggest that strain of accommodation may be a cause of glaucoma. This patient had 1. D. of accommodation which she was straining to the utmost, for both near and distant vision. Without any evidence of continuous increased intraocular tension, the field of vision had become distinctly narrowed and an excavation of the optic disk had developed almost typically glaucomatous in character, while periodical attacks of blurring of sight and discomfort had been occurring for a year or more. After the removal of the strain of accommodation these attacks absolutely ceased; and there is no reason to believe that anything of the kind occurred again until retinal hæmorrhages had appeared nearly three years later. It is nothing new to regard strain of accommodation as a cause of glaucoma, Walker, Schoen, and others have urged that it was a most important cause. The close relation of the ciliary muscle to the drainage area of the eyeball might give it an important influence.

As Priestley Smith pointed out twenty years ago, the common antecedents of glaucomatous attacks are "various conditions which obstruct circulation and tend to congest the venous system." The seasonal relations of glaucoma, its greater prevalence in winter in Europe (Giesler[5]), and in the rainy season in India (Maynard[6]) might be explained by changes in blood pressure. Since no organic changes in the sympathetic can be connected with glaucoma, its functional influence over the local circulation might be taken to explain the effect of sympathectomy upon the intraocular tension. Such an explanation would not be excluded by the fact that sympathectomy does not seem essentially to modify the blood pressure in general. The danger of provoking an outbreak by the use of adrenalin seems pretty certainly connected with the increase of blood pressure.

By reducing the blood pressure the nausea and profound depression sometimes seen in connection with the glaucomatous exacerbation, may tend to limit the outbreak; and thus prove truly conservative. In two cases observed with reference to this point, the blood pressure was reduced about 10 mm. in each during severe pain. The influence which glaucoma pain can exert upon general nutrition is neither slight nor transient. I have known a woman to lose almost one-third her weight in 8

weeks of secondary glaucoma following a blow on the eye; and to regain it in six weeks after the eye was enucleated. Several of the general measures resorted to for the palliation of chronic glaucoma might be considered of value because of their influence on blood pressure. Such are rest, diet, purging and the use of aconite. Fox and Batroff[7] found venesection a most effective means of reducing blood pressure in cases of intraocular hæmorrhage. Perhaps it should not be wholly neglected in connection with glaucoma. Many of us have seen relief from local bleeding.

The general blood pressure in glaucoma may be not without interest from the side of diagnosis. In a case recently seen—a secondary glaucoma from intraocular tumor lying to the temporal side of the optic nerve entrance, out of reach of transillumination —the patient came with an acute glaucomatous outbreak, and the media so clouded that ophthalmoscopic examination threw no light upon the diagnosis. In this case the arterial pressure was between 105 and 110 mm. It was interpreted as pointing rather to intraocular tumor than to primary glaucoma, and this view of the case was subsequently proved correct by examination of the enucleated eye. The influence of blood pressure may profitably be given a good deal of consideration in connection with glaucoma, although to think of it exclusively might be unprofitable as to fix the attention wholly upon the size of the pupil or the closure of the angle of the anterior chamber.

With reference to the angle of the anterior chamber, some of us in the past have thought too much of the *closure of the filtration space by the pushing forward of the iris.* Fuchs[8] in his paper before the British Medical Association last year pointed out, how in glaucoma, secondary to perforation of the cornea, the iris falling against the cornea when the aqueous escapes, becomes adherent and thus closes the filtration space. But Thomson Henderson[9] finds that in primary glaucoma the displacement forward of the iris is not so much due to pressure from behind as to a process of sclerosis; which beside the dragging forward the root of the iris, tends to close the open mesh-work which affords communication between the anterior chamber and the venous sinus known as the canal of Schlemm.

It was by attention concentrated too much on the condition posterior to the iris that the symptom described by Tenney[10] and Würdemann[11] as elicitated by *transillumination,* was ascribed to a "narrowing of the circumlental space." The *narrowing of the circumcorneal ring of light* is noted in many cases of glaucoma

when examined with the transilluminator. But neither the lens nor the circumlental space has any direct effect on the width of this ring. This illuminated ring is produced by light which passes in front of the iris, from the illuminated sclera and limbus at one angle of the anterior chamber, to be partly reflected from the posterior surface of the cornea, and concentrated on the limbus about the other side of the cornea. The symptom of narrowing of the ring depends upon narrowing or obliteration of the angle of the anterior chamber, in whatever way this may be brought about. This symptom has some practical value for the recognition of a predisposition to glaucoma; probably more value than the general shallowness of the anterior chamber, which has long been recognized as significant.

The blocking of the drainage channels of the eye, by the deposit of solid particles in the meshes of the filtration space is a method of causing glaucoma which has in the last few years been demonstrated in cases arising from widely different causes. Introducing a steel needle into the aqueous for the positive pole, Erdmann[12] by electrolysis produced glaucoma through the deposit of fine granular particles of oxidized steel in the meshes of the filtration space. A condition practically identical with buphthalmous has thus been produced by Schreiber and Wengler.[13] Raehlmann,[14] with the ultramicroscope demonstrated in the aqueous minute particles which became agglutinated under certain conditions, forming masses that tended to block the filtration channels. These were particularly numerous when the globulin of the lens had been set free in the aqueous by cataract operations. Pigment particles have been found in the meshes of the filtration space after intraocular hæmorrhage (Levinsohn[15]); and tumor cells in the glaucoma secondary to intraocular tumors (Verhoeff[16]).

The possibility of impaired filtration due to alteration in the character of the intraocular fluid, apart from any solid particles that it may carry, has stimulated interesting investigations by Leber, Troncoso, Henderson and Starling, and others. But the extent to which such changes are responsible for the occurrence of glaucoma, and their exact character are still to be determined.

METHODS OF TREATMENT.

In Case V, mentioned above, one instillation of eserin, ¼ of 1 per cent. solution brought the tension down from +T. 2 to normal; and the vision from 2/40 up to 4/9, with complete relief from pain in a few hours. In Case II, pilocarpin has seemed to hold the process in check for more than 2 years. In the latter

case, too, the internal administration of strychnia was followed by a notable increase in vision; and a still greater improvement in the ease and comfort with which the eyes can be used. It would not be unreasonable to suppose that strychnia was particularly indicated by low blood pressure, and tendency of the optic nerve to give way before a moderate intraocular tension.

But in Case I, although the iris was not much altered, miotics, even a 1 per cent. solution of eserin, exerted only an imperfect and temporary influence on the intraocular pressure. In this case, although the rise of tension was preceded by many retinal hæmorrhages, and a large hæmorrhage occurred in the iris when posterior sclerotomy was done; and the vitreous was clouded, probably with hæmorrhage at the time of the operation, iridectomy, with care to secure incarceration of the iris, gave a very satisfactory permanent result. There was no serious hæmorrhage after the iridectomy. The eye became entirely quiet and free from pain, the light perception that she had at the time has been preserved, and the tension remains normal after 13 months.

It has occurred to me that the immunity from destructive hæmorrhage following the iridectomy in this case was probably favored by the inflammatory process which went on within the eyeball, during three weeks before iridectomy was resorted to. It was pointed out by Bull[17] that in gouty disease of the retina, with alteration of the vessel walls, retinal hæmorrhage was a common symptom only in the early stages; was less likely to occur later, when the vessel walls had undergone greater or more general thickening. This observation I can confirm from my own experience. With a rather acute inflammatory condition within the eyeball it seems quite possible that changes in the vessel walls might occur in three weeks that would materially diminish the danger of hæmorrhage. A good many cases of hæmorrhagic glaucoma relieved by iridectomy have been placed on record; and certainly in some cases where retinal hæmorrhage has preceded the glaucoma, the tendency to hæmorrhage has largely passed away before the outbreak of glaucoma occurred. It may be that in hæmorrhagic glaucoma judicious temporizing may contribute to the obtaining of a favorable result. Of course where early operation offers a chance for useful vision no delay would be allowable.

Posterior sclerotomy in Case I. gave prompt and complete, although temporary relief. This has been my general experience with the operation. In one case, however, where the eye was blind after probably more than ten years of simple glau-

coma, and three months of recurring attacks of pain and congestion, the relief afforded by one such operation, with subsequent use of pilocarpin, continued until the patient's death several months afterward.

The operations designed to produce a permeable or filtration scar without incarceration of the iris, are now attracting a good deal of attention. Whether they will be given a permanent place among the operative measures proper for the relief of glaucoma, I think is still doubtful. The incision suggested by Herbert[18] I have tried on a case of glaucoma secondary to recurring uveitis, in connection with a small iridectomy. About 2 years have elapsed. There have been repeated attacks of uveitis, but only once, 14 months ago, has there been a slight increase of intraocular tension. The sclerectomy of Lagrange[19] and the recent suggestions of Holth and others at the Naples Ophthalmological Congress, I have not tried. But in a case in which I shaved away most of the thickness of the sclera over an area 3 by 4 mm. in size, in removing a sarcoma of the limbus, the subsequent healing was smooth, and the eye retained normal vision two and one-half years later. The sclera at the point in question remained thin, transmitting more light by transillumination than other portions. But the tension of the globe became and continues normal.

Neither have I tried cyclodialysis. That it relieves glaucoma seems to be established, and the relief is more permanent than that afforded by posterior sclerotomy. But that it is superior to iridectomy in any single class of cases seems to me not yet certain. Recent observations on eyes examined anatomically after the operation by Wernicke[20] and Joudine[21] failed to demonstrate the establishment of any channel of communication between the anterior chamber and the suprachoroidal space, the avowed purpose for which Heine suggested the operation. It is quite possible however, that in some other way operative interference in this situation may re-establish efficient drainage.

Two possible explanations of benefit from such different plans of operative interference may be suggested. One is that the filtration space is situated at a re-entering angle of the corneoscleral coat. The larger sphere of the sclera and the smaller sphere of the cornea at their junction form a re-entering angle. The greater thickness of the coat in this region tends to maintain the angle, permitting the cornea a relative bulging forward, and the sclera a relative bulging behind. *Any operation that weakens the thicker ring of corneo-scrleral tissue at the region of the*

limbus tends to permit an enlargement of the eyeball at the ciliary ring. Now if narrowing of the circumlental space, through prolonged growth of the lens, as pointed out by Priestley Smith, be a factor in the production of glaucoma, any operation that causes the corneo-scleral ring to give way will enlarge this space and to that extent favor drainage. The incisions for iridectomy, sclerectomy, or Herbert's operation, to establish a permanent scar, all tend to weaken the external coat of the eye in this region and so to permit bulging. The separation of the ciliary body from the sclera by cyclodialysis with the disturbances of nutrition in the part it must necessarily set up, would have somewhat the same effect.

The operation known as Hancock's operation, which never came into general use, but which was enthusiastically advocated by Hancock at about the time that Graefe suggested iridectomy for glaucoma, has been favorably spoken of by all who have reported experience with it.[22] I never resorted to it but once. This was in a case of glaucoma secondary to recurring uveitis, in which no more deliberate operation seemed practicable. Although attacks of uveitis continued to recur subsequently the intraocular tension did not again rise above normal. This operation consists in a single stab, making a meridional incision through the ciliary region, and produces a very marked local bulging through the weakening of the corneo-scleral coat, caused by the division of its thickened ring. In some such way it is possible that cyclodialysis, after its primary drainage of fluid from the anterior chamber, may cause an increase in the ciliary diameter of the eyeball and thus oppose any subsequent rise of tension.

The other possible explanation, which also applies to all operations upon this region, is that *through the formation of new vessels there may come a re-establishment of the connections between the interior of the eye and the canal of Schlemm,* which will permit the intraocular pressure to drop nearer to the venous pressure of the body. We have all watched the formation of new vessels within the eye in keratitis in the cornea, upon the surface of the iris with iridocyclitis, in the vitreous or retina after hæmorrhage. Vessel formation is an essential step in the repair of injuries, goes on quickly and freely in the tissues of the eye; and it is quite possible that in an eye suffering slow sclerosis, which has altered most of its vessels, the new vessels formed in the repair of the operative lesion, may furnish venous channels of outflow, far more efficient in keeping down the intraocular

pressure than more numerous vessels that the tissues originally contained. In Case I. large veins can now be traced from the interior of the eye through the corneal scar to the conjunctiva, while several of them emerge through the scar left by the sclerotomy; the tension of the eye remaining —T. Henderson has pointed out that the veins of the iris, and those of the ciliary body, as well as those more directly in relation to Fontana's space, empty into Schlemm's canal, and afford efficient drainage channels. After all operations in this region new venous channels are formed, and perhaps upon these new channels, even when not especially noticeable by the naked eye, the efficiency of our various glaucoma operations may largely depend.

In this long and somewhat rambling paper I have not spoken of the operation of sympathectomy. We hear and read less about it than two or three years ago. It is not a solution for all the hard problems presented by glaucoma; if, indeed, it be the best solution for any of them. But it can exert a beneficial influence on increased intraocular pressure. This ought still to be borne in mind in our general consideration of glaucoma. The danger at present is that sympathectomy and the lessons learned from it will be completely forgotten.

In conclusion I have no summary of peculiar views to offer. I have tried to bring to mind the wide essential variations that cases of glaucoma present, some of which may depend on variations in general or local blood pressure. In hæmorrhagic glaucoma, inflammatory alterations of the vessels may prove beneficial. For glaucomatous excavations of the optic nerve with low blood pressure strychnia may be particularly appropriate. As factors in producing benefit by operation, bulging of the ciliary region, and the formation of new venous channels are suggested. But the chief aim has been to discuss clinical observations, and the recent literature of the subject from an individual standpoint. In dealing with serious problems, such as are presented to us by glaucoma, to get a glimpse of them from the point of view of another is always a help.

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THE THEORY OF VISION.

F. W. Edridge-Green (*The Lancet*, Oct. 2, 1909) believes the rods in the retina are concerned only with the visual purple and its diffusion and not with transmitting visual impulses. His theory of vision is as follows: The cones of the retina are insensitive to light but sensitive to chemical changes in the visual purple. When light falls upon the retina the visual purple is set free from the rods and diffuses into the fovea and other parts of the rod and cone layer of the retina. The ends of the cones are stimulated by the decomposition of the visual purple, probably by the electricity which is developed, and a visual impulse is brought about and carried to the brain by the optic nerve. Just as the rays of light differ in wave length so he supposes the visual impulse caused by different rays of light differ in character. Thus the physiological basis of the sensation of color is in the quality of the impulse while the physiological basis of the sensation of light is in the impulse itself. A special perceptive centre in the brain is concerned with the perception of the quality of the impulse. He recalls the anatomical arrangement of the retina and believes it is consistent with his theory. Thus, in the fovea of the retina only cones are to be found. Immediately external to this each cone is surrounded by a ring of rods. As the periphery is reached the number of rings of rods around each cone increases and the outer segments of cones are in a space filled with fluid while the external limiting membrane retains this fluid in its place. We can understand how adaptation to dark is brought about by a steadily increasing amount of visual purple being added to this fluid, which makes it more and more sensitive to light. The connections of the cones with the inner layers of the retina can easily be traced, but the rod fibres seem to end in nucleated enlargements.

TUMOR OF THE PITUITARY BODY.*

By J. F. Shoemaker, M.D.,
St. Louis, Mo.

REPORT OF A CASE WITH COMPLETE OPTIC NERVE ATROPHY.

Since very little concerning diseases of the pituitary body and their relation to optic nerve atrophy is to be found in ophthalmic literature, and as text-books on ophthalmology are practically silent on this subject, a report of the following case may be of value.

Miss H. S., aged 23, consulted me August 13th, 1908, because of loss of vision which had developed during the past eight months. Inquiry into the history of the case elicited the following facts: Family history negative. Her birth was natural, and as a child she was healthy although she suffered considerably from headache after she began going to school. Had measles when a young child, at what age not known. When thirteen years of age had a rather severe attack of diphtheria, followed by paralysis of the pharyngeal and ciliary muscles from which she completely recovered. Began menstruating when fourteen years of age and this function was normal for about two years. At sixteen menstruation ceased and has not occurred since, although she has been in fairly good health. In January, 1908, she first noticed that the vision of the right eye was very poor and confined to a small part of the temporal half of the field. Five months later the vision of the left eye began failing in the temporal half of the field. She had suffered no pain in the eyes but stated that at times she had been having some pain through the right temple. Had not had any serious illness. The patient was five feet eight inches in height and weighed about 140 pounds. She was pale and anæmic but otherwise seemed well nourished.

Upon examination I found V. O. D. nil. V. O. S., fingers at five feet. The pupils were large, about 5 mm.; the left responded feebly to light but there was no response in the right. Ophthalmoscopy showed clear media, complete atrophy of the right optic nerve and well marked atrophy of the left. There were no evidences of a previous neuritis. Otherwise the fundi were normal. A perimetric test showed that the field of vision in the

*Read at the meeting of the Ophthalmic Section, St. Louis Medical Society, Dec. 1st.

left eye was limited to the lower nasal quadrant. The cause of the optic atrophy evidently was either an abscess in the sphenoidal sinus or a tumor pressing upon the optic chiasm, most likely the latter. She was referred to a rhinologist who reported that there was no evidence of any involvement of the accessory sinuses. An examination by a neurologist gave no additional information, there being no localizing symptoms aside from the optic atrophy. A diagnosis of probable tumor in the region of the optic chiasm was accordingly made, with which an internist who saw the case concurred, and a bad prognosis as to vision given. About two weeks later the little vision she had in the left eye was lost and she has seen nothing since. She returned to her home in southeastern Missouri where she was under the care of her family physician. October 6th he reported to me that a week or ten days before she began having very severe headache and later became delirious. This mental condition lasted nearly a week, when, after a rather profuse discharge of pus and blood from the naso-pharynx, the patient became quiet, the mind cleared up, and her condition was much improved. October 12th he reported that the discharge from the naso-pharynx had ceased and the condition of the patient was getting much worse again, with symptoms of brain pressure. There appeared to be an infection of the orbital tissues on the right side. These reports made me think that perhaps I had been mistaken in my diagnosis and that after all the cause of the optic atrophy had been a hidden abscess in the sphenoidal sinus. Nothing more was heard of the patient until the past summer when she was brought to my office and I was afforded an opportunity to further study the case. She reported that she gradually recovered from the condition she was in last fall and had been in good health since then but frequently has sharp pains through the temples. These pains last only a short time, but are very severe. Her mother states that she eats ravenously and sleeps a great deal of the time. There was complete atrophy of both optic nerves. A thorough examination by a competent rhinologist revealed no evidences of trouble, past or present, in the accessory sinuses. An X-ray picture of the skull showed an enlarged, abnormal sella turcica.

A careful review of the history of the case and the symptoms connected therewith convinced me that my original diagnosis was correct and that the cause of the optic atrophy was not an involvement of the sphenoidal sinus but was a growth pressing upon the optic commissure and that this growth either arose

from the pituitary body or at least involved it. The only symptoms in the case strongly suggestive of sphenoidal sinus involvement are: (1) the discharge from the naso-pharynx for several days in October, 1908, with relief from the brain symptoms which became worse again after the discharge ceased; and (2) the apparent infection of the right orbital tissues. The first of these can be otherwise explained as we shall see later, and the second might have occurred from some other cause. On the other hand there had been no symptoms of sinus trouble before the loss of vision; two rhinologists found no evidence of such trouble; and the hemianopic visual fields indicate that the lesion involved the optic tracts rather than the optic nerves.

Pituitary hypertrophy or tumors, when they involve the visual fields, usually produce bitemporal hemianopsia as the pressure is generally on the crossed fibres in the optic commissure. In fact some writers claim that all cases of bitemporal hemianopsia are due to pituitary disease. In this case, according to the statement of the patient, the hemianopsia was homonymous, the right eye being affected in the nasal field first while in the left eye the vision was lost in the temporal field first. This, if her statement be true, would indicate that the right optic tract became involved first, which might be possible with a tumor in this location. The cessation of menstruation at the age of sixteen with entire absence of this function since, points very strongly toward disease of the pituitary body; and the enlargement of the sella turcica as shown by the radiograph, could be caused only by some enlargement of this gland or a tumor in this location.

The development of a cyst in the pituitary gland would most likely bring about the sequence of events found in this case. Beginning about the age of puberty and developing slowly, by the time the patient was sixteen it could have become large enough to lessen the function of the gland sufficiently to bring about cessation of the menstrual flow. Continuing to enlarge slowly, in the course of years it began to press upon the optic tracts and chiasm, causing the loss of vision and atrophy of the optic nerves. Further enlargement might produce pressure enough to cause brain symptoms and also to erode the thin plate of bone at the bottom of the sella turcica, so that with the rupture of the cyst its contents might escape through the sphenoidal sinus and thus discharge into the naso-pharynx. The rupture of the cyst with escape of its contents from the cranial cavity would relieve the intracranial pressure and thus permit the symptoms due to this pressure to disappear.

The diagnosis of pituitary tumor in this case is therefore based upon the following facts:

1. The cessation of menstruation.
2. The hemianopic visual fields, followed by complete atrophy of the optic nerves.
3. The enlargement of the sella turcica as shown by the radiograph.

In connection herewith, a brief consideration of this gland may not be amiss. The pituitary body is a small, glandular organ, weighing between 5 and 10 grains, averaging about 7½ grains, and rests in the sella turcica. It measures about 14 mm. in its lateral dimension, 7 mm. in its antero-posterior and 6 mm. in thickness. Its color is dark brown and its consistency much the same as that of the liver. It was first described by Vesalius (1553) who called it the "glans pituitam excipiens" under the mistaken idea that it secreted the nasal mucous (pituita). It was more fully described by Soemmering (1778) who named it "hypophysis cerebri." Embryonically derived from two different sources, it is a bilobed organ, although the two lobes do not correspond exactly with the ectodermic organs. The anterior lobes is the larger of the two and is developed from the ectoderm of the buccal cavity. It is entirely epithelial in character. The posterior lobe is made up of a nucleus coming from the midbrain ectoderm, hence neural in structure, which has been surrounded and fused with a part of the epithelial sac derived from the buccal cavity. The two lobes are separated by a distinct groove. The blood supply of the anterior lobe comes indirectly from the internal carotid artery while that of the posterior lobe comes from the pia mater surrounding the infundibulum.

The physiology of this small gland is of great interest and a knowledge of its function is highly important to properly diagnose diseases of the pituitary body. While much has been learned along this line the past few years, it is not fully known yet just what is its physiological function. A few things, however, seem to be practically settled. By noting the symptoms that had occurred in cases where the pitutary body was found, post-mortem, to be diseased, and by experiments on animals, it has been pretty thoroughly established that an increased secretion by this gland stimulates overgrowth, which when it occurs in the young results in gigantism and when in the adult produces the condition known as acromegaly. One observer found but one case in which the pituitary gland was not enlarged in sixty-nine cases of acromegaly examined. On the other hand, a con-

siderable decrease in the secretion of this gland results often in a rapid accumulation of fat in the body with a stunting of the body growth, especially of the sexual organs in the young, and in adults causes atrophy of the ovaries and testes with cessation of the menstrual flow in women and impotence in men. The function of the anterior lobe seems to be much more important in its influence over the body functions than the posterior. Harvey Cushing has recently experimented on animals, removing one or both lobes in over one hundred animals and believes that this gland is essential to life; at least, the animals from whom the whole gland had been removed soon showed marked signs of mal-nutrition and eventually died. These symptoms were greatly modified, however, by the feeding of pituitary substance. Cushing believes that much can be hoped for in the future from glandular therapy.

There appears to be a close interrelation between this gland and the other ductless glands. Thus the ablation of the thyroid produces marked changes in the pituitary, while the removal of the pituitary induces acute hypertrophy of the thyroid. It is more than probable that a pathological condition in any one of these glands brings about a change in the function of the others in order to supplement as much as possible the work of the diseased gland.

Among the pathological conditions found in the pituitary body which may affect the optic nerves are: hypertrophy of the gland, adenoma, lipoma, fibroma, glioma, carcinoma, the various forms of sarcoma, teratoma, gumma, ecchinococcus cyst and other kinds of cysts, chief of which is the retention cyst. The retention cyst is probably the most frequent tumor found in the pituitary body and adenomata are likely second as to frequency.

A diagnosis of hypophyseal tumor having been made, what then? Shall we as oculists be content to make the diagnosis and let the case go on to complete blindness? A few years ago this is all that we could have done. However, surgery has come to our assistance here and has been successful in removing the tumor, and best of all, in a number of cases the patients have recovered with very useful vision. These cases have shown, too, that theories built up from experiments performed upon animals will not always hold true in man. Pawlesco and Cushing, from their experiments upon dogs and other animals, conclude that the removal of the pituitary body would result in death from a cachexia somewhat similar to that produced by the total removal of the thyroid. As Archibald Church suggests this may be so

where the healthy gland is removed but where the organ has been diseased for some time, the other ductless glands in the body may to a certain extent have gradually assumed a vicarious function or the body have gradually become accustomed to the absence of the product of the gland so that practically all of the diseased pituitary body may be removed and the patient make a very good recovery. Church reports a case in which the hypophysis had become changed into a large tumorous mass and was practically all removed, the patient finally recovering with no symptoms of apituitarism. It would seem, then, that where the vision is becoming progressively worse in case of a pituitary tumor we should advise its removal by surgical means.

There are several methods of getting at tumors in this location. One, advised, and practised by Sir Victor Horsley, is to open the cranial cavity on the side and, elevating the brain tissue, thus approach the pituitary body. Another, used by Schlosser, Eiselberg and others, is to make an incision in the median line of the brow and along the side of the nose, dividing the nasal bones and displacing this organ to the other side. The nasal septum is cut, the turbinates are removed and with the removal of the vomer the sphenoid bone is reached with nothing but a thin plate of bone to pass through to be within the sphenoidal sinus. As many of these tumors develop downward they are often found within the sinus, having completely eroded the floor of the sella turcica. This method has the advantage of getting at the tumor and removing it without much disturbance of the brain as it is practically extracranial. The disadvantages are that there is some danger of the brain's becoming infected and that a good deal of facial deformity follows. Allen B. Kanavel (*Jour. A. M. A.*, Nov. 20) describes a proposed modification of this operation that will avoid this deformity. He says: "The infranasal route is proposed in contradistinction to the supranasal route for reaching the tumors of the pituitary body. The technic in general consists in elevating the nose, cutting the cartilaginous septum, removing the middle turbinates, deflecting the septum, locating the sphenoidal foramina, biting off the intervening attachment of the perpendicular plate of the ethmoid and vomer, entering the sphenoid cells and thus reaching the floor of the sella turcica." With this improved technic doubtless the danger of infection can also be greatly lessened and the removal of these tumors be accomplished with comparative safety if, after removing, the tumor symptoms of apituitarism develop the administration of pituitary substance may be of considerable value until the body has become accustomed to the altered conditions.

MEDICAL SOCIETIES.

XVI. INTERNATIONAL CONGRESS OF MEDICINE.*

Held at Budapest August 28th to September 4th, 1909.

SECTION ON OPHTHALMOLOGY.

Report by Professor Dr. W. Stock, Dr. von Szily (Freiburg), and Dr. Cohen (Breslau).

TRANSLATED BY ADOLF ALT, M.D.

(Continued from November number.)

Golowin (Odessa).—*Sclerosis orbitæ inflammatoria progressiva.*

For ten years Golowin has observed in a patient a periodic inflammation with considerable pain in the region of the one or other orbit. In the intervals there is exophthalmus and an increasing ophthalmoplegia.

An explorative opening of the orbit by means of Kroenlein's operation as modified by Golowin revealed nothing but connective tissue sclerosing on an inflammatory basis. He proposes the name of "cellulitis orbital sclerosificans."

Onodi (Budapest).—*The relation of the accessory cavities to the optic nerve and the other eye nerves.*

By means of beautiful specimens the author showed the variability of the sphenoid cavity and the posterior ethmoid cells, especially as to their connection with the contralateral disturbances.

Paunz (Budapest).—*Mucocele of the frontal sinus and the ethmoidal cells.*

The author had occasion to operate on four cases, two men and two women, for chronic ectasia of the frontal sinus and ethmoidal cells. The nose showed no alteration in two of these cases, but there was a chronic inflammation in the accessory cavities affected. Once there was chronic atrophic nasal catarrh, once a muco-purulent inflammation of the ethmoidal cells. In

*Klin. Mtsbl. fuer Augenhlk., September, 1909.

all of the cases he found large defects in the bone, as well in the lower and posterior (cerebral) wall of the frontal sinus, as in the lamina papyracea. The orbital contents and dura mater were exposed. The contents were mucoid and odorless. Such ectasiæ must be looked upon as chronic inflammations of the accessory sinuses. The closure of the excretory canals dams up the secretion. All of these cases were operated upon from the outside with drainage into the nasal cavity and were cured. The main point in the operation is to make a large opening into the nasal cavity.

Wicherkiewicz (Krakau) states that he has succeeded in curing several mucoceles by aspiration of their contents and injection of pyoctanin.

Paunz warns against such a procedure as very dangerous.

Di Nola (Rome).—*Osteoma of the orbit.*

Case of a girl 18 years old in whom by means of Roentgen rays an osteoma of the orbit was diagnosed. Since the vision was in no way disturbed, no operation was performed.

von Csapodi (Budapest).—*A new unit in determining visual acuity.*

As is well known, the visual acuity is generally described after Snellen in common fractions. The smallest value is 6/601, full visual acuity being 6/6=1.

Since 1886 Csapodi has used a distance of 5 m. for his Hungarian test types. His unit therefore is 5/5 m. He recommends a new system for the determination of the visual acuity.

He thinks the measurement of the visual acuity should be made analogous to the dioptric system according to Donders for the measuring of refraction and accommodation. According to Donders 1/100 cm.=1 dioptry. Csapodi's system assumes the smallest Snellen value V=5/50, i.e., 1/10, as the unit in measuring the visual acuity, and calls it a katoptry. Thus he calls full visual acuity, or V=5/5=1, 10 katoptries.

Every line of Snellen's plates can be expressed in katoptries, by multiplying it with 10; for instance, 5/20×10=50/20=2.5 K. Inversely every katoptry can be reduced to V. by setting underneath it as denominator 10; for instance, 5 K.=5/10, or 10 K.= 10/10=5/5.

Csapodi wants to leave Snellen's system untouched, and its

values in common fractions may be retained as historical synonyms, but for the official description he recommends the katoptric values.

J. von Siklóssy (Budapest).—*On test types and the determination of the visual acuity.*

1. The result of practical visual examinations does not solely depend on the recognition of the *minimum separabile.* The visibility of the visual tests in use is of considerable weight. Therefore only such objects can be used as visual tests, which are equal in visibility.

2. The hook figure with unequal limbs (Snellen, Ewing, Pflueger, de Wecker, Csapody) does not correspond with the principle of the *minimum separabile.* A similar figure with 3 equally long limbs fills all the requirements which are necessary for a testing object.

3. The visibility of the letters (antiqua in Snellen's form) is not at all equal. It is easiest to recognize L, I, J, O, U—most difficult B, C, K, M, N, S, X.

4. The visibility of the figures is not at all the same; easiest are 1, 4, 7, 0—most difficult 3, 5 and 8.

5. The visibility of the circular figure with an opening (after Landolt) equals the visibility of the most difficult letters and figures.

6. If we assume the visibility of Landolt's figure to be 1, that of the more easily recognizable letters and figures is 1, 6, that of the letters not mentioned here (as A, D, E, F, G, H, P, R, T, V, Z and Y) and of the figures (2, 6, 9) and of the hook figure with equal limbs, is 1, 3.

7. In international test types only the easily recognized figures (1, 4, 7, 0) are used, the size of which compared with the circular figures of Landolt is as 1, 2:1.

8. As a measuring unit of the visual acuity nothing but the acuitas unit (1A) can serve; that is, so much visual acuity that a distantia separabilis of 1 cm. can be recognized in 1 m.

9. As examining distance 5 m. should be adopted.

10. For practical examination letters are most appropriate. I, J, L, O, U as well as B, C, R, M, N, S and X should be left out. If they are used their index of visibility should be taken into account in their construction.

11. For examining, analphabets or for control the hook figure with equal limbs is best.

12. It is very handy to examine analphabets with figures, but there must be enough of these for selection.

13. In constructing optotypes the visibility of the figures must also be taken into account. This is for 1, 4, 7, 0=1, 6; for 2, 6, 9=1, 3; for 3, 5, 8=1 when the visibility of Landolt's figure is also =1.

14. The normal visual acuity when measured with letters, figures or hook figures with equal limbs, the visibility of which is of medium value and which are equal in visibility, is 45 *acuities* (V=5/3, 85=6/4, 8).

Antonelli and Marquez speak against the use of the word katoptry.

J. von Siklóssy (Budapest).—*On laws concerning the ability of railroad employees, especially as regards their visual organs.*

Edridge Green (London).—*The theory of vision.*

The author details his well known theory of vision, which is based on an assumed function of the visual purple.

Imre (Klausenburg).—*Operation of habitual spastic entropium.*

A perfect cure can be obtained only by stretching the skin of the lid permanently. The less skin is sacrificed during the operation, the better. From the middle of the external lidmargin he forms a skin flap straight or obliquely downwards 4 to 5 mm. broad and about 15 mm. long. The incisions begin just at the cilia. He loosens this narrow flap, without taking any subcutaneous tissue along, up to the lidmargin; then puts it carefully on the stretch and observes by how much the strip of skin must be shortened in order to obtain a corresponding turning outwards of the whole lid. It is usually sufficient to remove 4 or 5 mm. from the lower end of the flap. The shortened flap is stitched at both its lower angles and at the sides by four sutures and the eye is bandaged for two days. He has operated on six such cases with perfect success. He sacrifices only five times 15 to 25 mm. of skin, the folds of the skin of the lid are altered in the centre and for a short time only; the function of the orbicular muscles is not disturbed, the adaption of the lid to the eyeball is secured. The chief point is the possibility of exact dosage.

A. Marina (Triest).—The ciliary ganglion is the peripheral centre of the pupillary reflex.

Vajda (Miskolc).—*The importance of hyperopia in manufacturing laborers and trades people.*

The author has examined 950 such patients from his district in his ambulatory clinic and found that:

1. Hyperopia plays a more important rôle than has hitherto been accepted in the ætiology of certain forms of affections of the conjunctiva and lids.

2. Hyperopia forms a much greater obstacle in the way of laborers and tradespeople than myopia.

G. S. Ryerson (Toronto).—*Pressure inunction of the eye.*

For the absorption of plastic exudates in the eye Ryerson makes eye massage with a mixture of calomel and vaseline and ties the eye up with an elastic flannel bandage.

Juselius (Wyborg).—*Experimental researches into the regeneration of the corneal epithelium.*

At the Freiburg clinic the author has histologically examined into the regeneration on a series of superficial corneal defects produced with von Hippel's trephine. First, there is at the periphery of the cornea a "karyokinetic" wave; when this has reached the edge of the defect, the regeneration takes place by the filling of the defect by direct cell division. He has studied on the eyes experimented on, which medication may hasten and which will hinder the regeneration. He found that cocain, cold, subconjunctival injection of mercury bichloride and stronger salt solutions (up to 6 per cent) hinder regeneration; 2 per cent. salt solution, subconjunctivally injected, warmth and dionin act favorably.

Fejér (Budapest).—*Contributions to the pathology and therapy of embolism of the central retinal artery.*

The author discusses the picture of embolism of the central retinal artery from the three standpoints as to the ætiological importance of diseases of the heart and bloodvessels, and concerning the total or partial obliteration of the bloodvessel, and finally the therapy by means of circular massage of the eye. He reports three cases as cured in which he applied this massage immediately; in one he saved a certain part of visual acuity, in the other two normal vision was obtained. He thinks that in young individuals bloodvessel affections are not always the cause, but that there must be local causes.

The success of the therapy depends on the rapidity with which the massage is performed, since it may succeed in the breaking up, dislodging and shrinking of the embolus; it may, also, produce dilatation of the bloodvessels, an increased circulation, a quick outflow of lymph, and the diminution of the intraocular tension.

Schuetz and Vidéky (Budapest).—*On the so-called scrophulous eye diseases.*

The so-called scrophulous eye diseases are blepharitis, phlyctænules and vascular keratitis. The symptoms are photophobia, œdema of the upper eyelid, rhagades and different forms of eczema. These symptoms have been observed simultaneous or alternately with other so-called scrophulous changes in the skin and mucous membranes and glandular swellings. Together with the phlyctænules, Czerny calls these symptoms an exudative diathesis. The authors state that in many cases the phlyctænular eye affections are favorably influenced by a purely vegetable diet and that relapses may be avoided by a mixed nutrition which is poor in fat and sugar. On the other hand, they have often observed cases which were unfavorably influenced by such a diet, but when tuberculin was injected responded with new phlyctænules and were then cured by tuberculin treatment in increasing doses, and relapses were for a time prevented. We can, therefore, distinguish between an exudative and a tubercular form of phlyctænules. Concerning the general organism the authors could find several types. The tuberculin injection proved bacillary infection, since the individuals reacted on tuberculin by local inflammatory processes and rises in temperature, and manifestly tubercular patients by focal reactions. They found, therefore, pure cases of exudative phlyctænules which did not react to tuberculin, exudative phlyctænules with bacillary infection, and exudative phlyctænules with manifest tuberculosis. Tubercular phlyctænules were, of course, also, found in tubercular individuals, in which case exudative symptoms were, too, found in a varying degree. The tubercular phlyctænules they consider to be manifestations of a tubercular intoxication, and they must necessarily be treated specifically. This must be repeated from time to time since the so-called immunity produced by continuous injections of tuberculin, lasts only for a certain period of time.

Pascheff (Sofia).—1. *Isolated monolateral paralysis of the oculomotor due to aneurism at the base of the skull.*

2. *Papillitis due to cysticercus of the medulla in the region of the olive.*

3. *Demonstration of his iridotome.*

Béla (Budapest).—*On the treatment of blennorrhoic conjunctivitis in the newly born.*—The author commends frequent flushings of the conjunctival sac with ordinary hydrant water.

(To be continued.)

REVIEWS.

BIOGRAPHIC CLINICS. Vol. VI. Essays Concerning the Influence of Visual Function, Pathologic and Physiologic, upon the Health of Patients. By George M. Gould. Philadelphia, 1909. P. Blakiston's Sons & Co. Price $1.

With every volume of these series of biographic clinics the interest in the matter treated upon has grown. The author certainly is convinced of the truth of his contentions, and neither abuse nor simple neglect have been able to swerve him from his purpose. Whether we are able to follow him to the end of his conclusions or have to stop part way, he surely deserves praise and admiration. It is, indeed, with regret that we note his statement, that this is the last of these interesting volumes.

SIGHT TESTING MADE EASY. By W. Wright Hardwicke. London: J. & A. Churchill, 1909; Philadelphia: P. Blakiston's Son & Co., 1909. Price $1.

This small practical manual contains nothing new, but may be well adapted for those who think that sight testing can be made easy in a very short time and in a few words. It is evidently written only for this class. ALT.

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CONTENTS.

ORIGINAL ARTICLES.

Recent Observations Concerning Glaucoma. By Edward Jackson, M.D., Denver, Colo. .353
Tumor of the Pituitary Body. By J. F. Shoemaker, St. Louis, Mo. .368

MEDICAL SOCIETIES.

XVI International Congress of Medicine, held at Budapest. Translated by Adolf Alt, M.D. .374

BOOK REVIEWS.

Biographic Clinics, Vol. VI. By George M. Gould. .380
Light Testing Made Easy. By W. Wright Hardwicke. .380

ABSTRACTS.

The Theory of Vision .367

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